Text of Adopted 19 TAC

Chapter 130. Texas Essential Knowledge and Skills for Career and Technical Education

Subchapter H. Health Science

§130.201. Implementation of Texas Essential Knowledge and Skills for Health Science.

The provisions of this subchapter shall be implemented by school districts beginning with the 2010-2011 school year.

§130.206. Anatomy and Physiology (One Science Credit).

(a) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisites: three credits of science. To receive credit in science, students must meet the 40% laboratory and fieldwork requirement identified in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum).

(b) Introduction.

(1) Anatomy and Physiology. In Anatomy and Physiology, students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Students in Anatomy and Physiology study a variety of topics, including the structure and function of the human body and the interaction of body systems for maintaining homeostasis.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(3) Scientific inquiry. Scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).

(5) Science, systems, and models. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(c) Knowledge and skills.

(1) The student conducts investigations, for at least 40% of instructional time, using safe, environmentally appropriate, and ethical practices. These investigations must involve actively obtaining and analyzing data with physical equipment, but may also involve experimentation in a simulated environment as well as field observations that extend beyond the classroom. The student is expected to:

(A) demonstrate safe practices during laboratory and field investigations; and

(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.

(2) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:

(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;

(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;

(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;

(D) distinguish between scientific hypotheses and scientific theories;

(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;

(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures;

(G) analyze, evaluate, make inferences, and predict trends from data; and

(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

(3) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:

(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;

(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;

(C) draw inferences based on data related to promotional materials for products and services;

(D) evaluate the impact of scientific research on society and the environment;

(E) evaluate models according to their limitations in representing biological objects or events; and

(F) research and describe the history of science and contributions of scientists.

(4) The student evaluates the energy needs of the human body and the processes through which these needs are fulfilled. The student is expected to:

(A) analyze the chemical reactions that provide energy for the body;

(B) evaluate the means, including the structure and function of the digestive system, by which energy is processed and stored within the body;

(C) analyze the effects of energy deficiencies in malabsorption disorders such as diabetes, hypothyroidism, and Crohn's disease; and

(D) analyze the effects of energy excess in disorders such as obesity as it relates to cardiovascular and musculoskeletal systems.

(5) The student differentiates the responses of the human body to internal and external forces. The student is expected to:

(A) explain the coordination of muscles, bones, and joints that allows movement of the body;

(B) investigate and report the uses of various diagnostic and therapeutic technologies;

(C) interpret normal and abnormal contractility conditions such as in edema, glaucoma, aneurysms, and hemorrhage;

(D) analyze and describe the effects of pressure, movement, torque, tension, and elasticity on the human body; and

(E) perform an investigation to determine causes and effects of force variance and communicate findings.

(6) The student examines the body processes that maintain homeostasis. The student is expected to:

(A) investigate and describe the integration of the chemical and physical processes, including equilibrium, temperature, pH balance, chemical reactions, passive transport, active transport, and biofeedback, that contribute to homeostasis; and

(B) determine the consequences of the failure to maintain homeostasis.

(7) The student examines the electrical conduction processes and interactions. The student is expected to:

(A) illustrate conduction systems such as nerve transmission or muscle stimulation;

(B) investigate the therapeutic uses and effects of external sources of electricity on the body system; and

(C) evaluate the application of advanced technologies such as electroencephalogram, electrocardiogram, bionics, transcutaneous electrical nerve stimulation, and cardioversion.

(8) The student explores the body's transport systems. The student is expected to:

(A) analyze the physical, chemical, and biological properties of transport systems, including circulatory, respiratory, and excretory;

(B) determine the factors that alter the normal functions of transport systems; and

(C) contrast the interactions among the transport systems.

(9) The student investigates environmental factors that affect the human body. The student is expected to:

(A) identify the effects of environmental factors such as climate, pollution, radioactivity, chemicals, electromagnetic fields, pathogens, carcinogens, and drugs on body systems; and

(B) explore measures to minimize harmful environmental factors on body systems.

(10) The student investigates structure and function of the human body. The student is expected to:

(A) analyze the relationships between the anatomical structures and physiological functions of systems, including the integumentary, nervous, skeletal, musculoskeletal, cardiovascular, respiratory, gastrointestinal, endocrine, and reproductive;

(B) evaluate the cause and effect of disease, trauma, and congenital defects on the structure and function of cells, tissues, organs, and systems;

(C) research technological advances and limitations in the treatment of system disorders; and

(D) examine characteristics of the aging process on body systems.

(11) The student describes the process of reproduction and growth and development. The student is expected to:

(A) explain embryological development of tissues, organs, and systems;

(B) identify the functions of the male and female reproductive systems; and

(C) summarize the human growth and development cycle.

(12) The student recognizes emerging technological advances in science. The student is expected to:

(A) recognize advances in stem cell research such as cord blood utilization; and

(B) recognize advances in bioengineering and transplant technology.